
Extending ELICIT to Explore Command and Control in Operations Scenarios

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Paper 005

Agenda

ELICIT 2.5

C2/Organizational theory

Decision-making scenario

Sensemaking agents

More scenario
flexibility

ELICIT 2.6

- Existing ELICIT task scenario
- Operations scenario Air Tasking Order (ATO) use case
- Modeling ATO operations scenario in ELICIT
- New ELICIT flexibilities

ELICIT Introduction

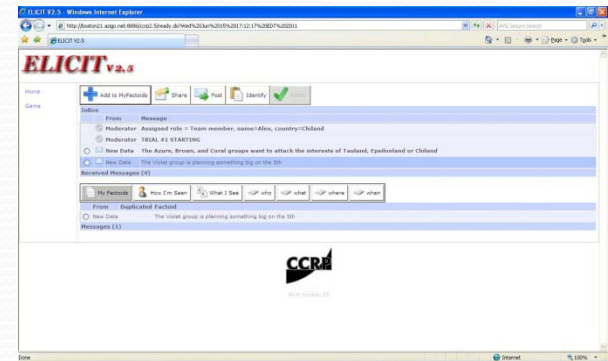
ELICIT-Experimental Laboratory for Investigating Collaboration, Information-sharing, and Trust

- Development and support sponsored by the Command and Control Research Program (CCRP)'s network-centric warfare initiative
- Designed to support developing and testing principles of organization that support agility
- ELICIT is a software platform with supporting tools and procedures



Base Experiment

- Multi-user
 - Live participants
 - Configurable Software Agents
 - Hybrid
- Varying organizational structure modes
 - Edge
 - Traditional C² hierarchy
 - Hybrid
- Experiment software records all actions for analysis



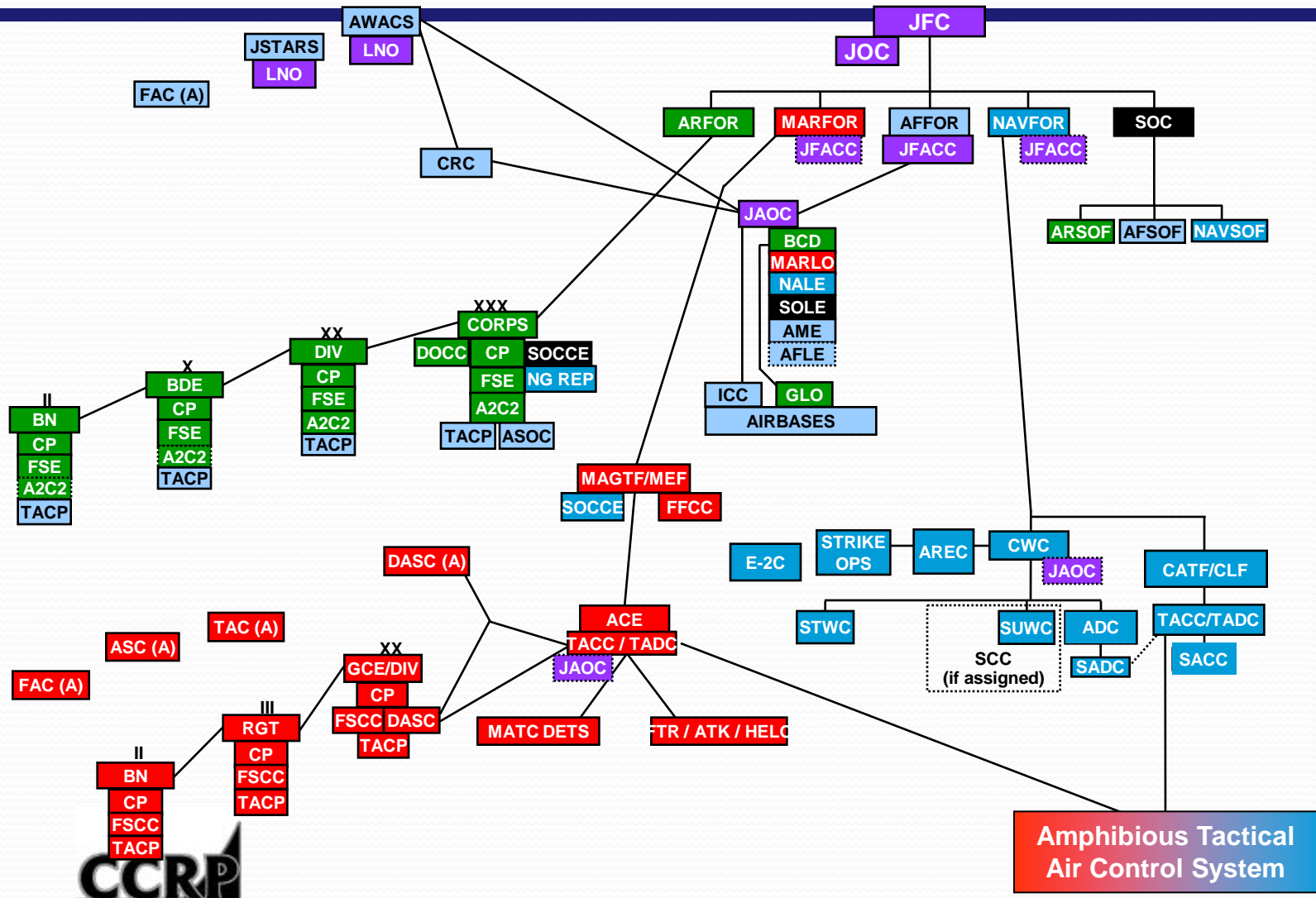
Baseline Task

- Identify the who, what, where and when of an adversary attack (intelligence task)
- Task scenarios are anonymized
- Participants are anonymized
- Participants periodically receive factoids about the situation
- No one person has all the information needed
- Task success requires communication
- All communication is through the experiment software

Baseline Task Limitations

- Only supports intelligence tasks
- Group size relatively fixed at 17
- Complexity of task relatively constant
- Limited modeling of decision making
- Limited modeling of chain of command

Theater C²



Amphibious Tactical Air Control System

Information Challenge

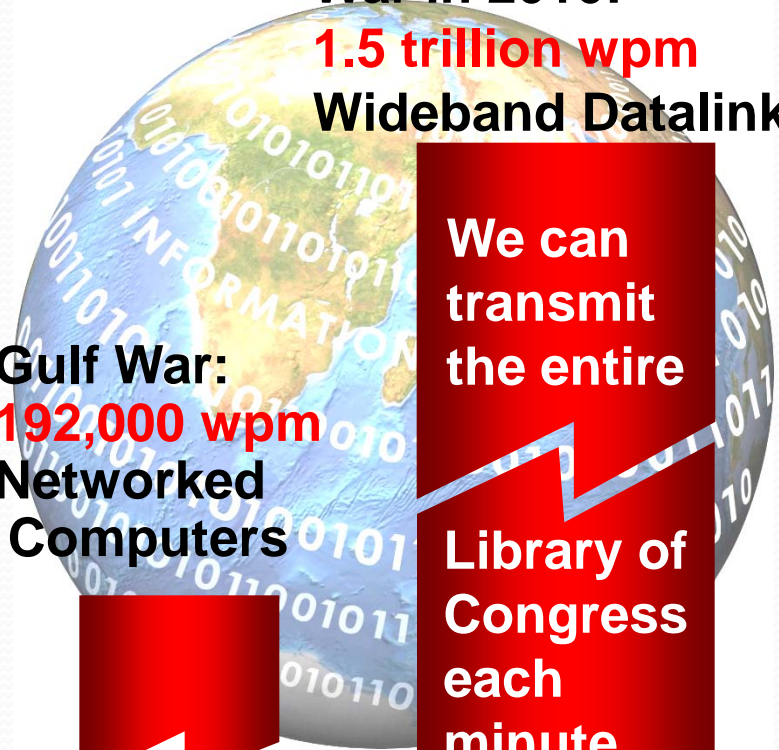
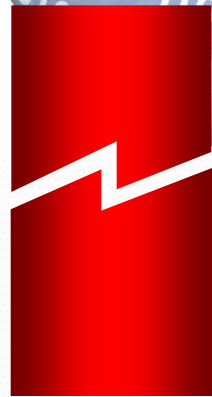
A Joint Challenge best solved by cooperative developmental efforts ensuring interoperability

**War in 2010:
1.5 trillion wpm
Wideband Datalinks**

**Gulf War:
192,000 wpm
Networked
Computers**

**We can
transmit
the entire**

**Library of
Congress
each
minute**



wpm - words per minute

**World War I:
30 wpm
Field Phone**



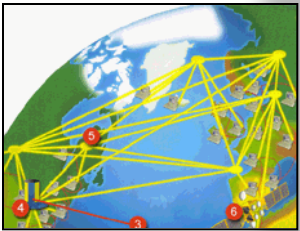
**World War II:
60 wpm
Radio**



**Vietnam:
100 wpm
SATCOM**



Com Challenge



IP Internetwork
Optical Fiber
10 Gbps

Free Space Optics (R&D)
1.1 Gbps

STD-CDL, A-CDL
ABE-CDL
274 Mbps

N-CDL (Testing)
137 Mbps (network)

HNW
TCDL
10 Mbps

TTNT
WNW
2 Mbps

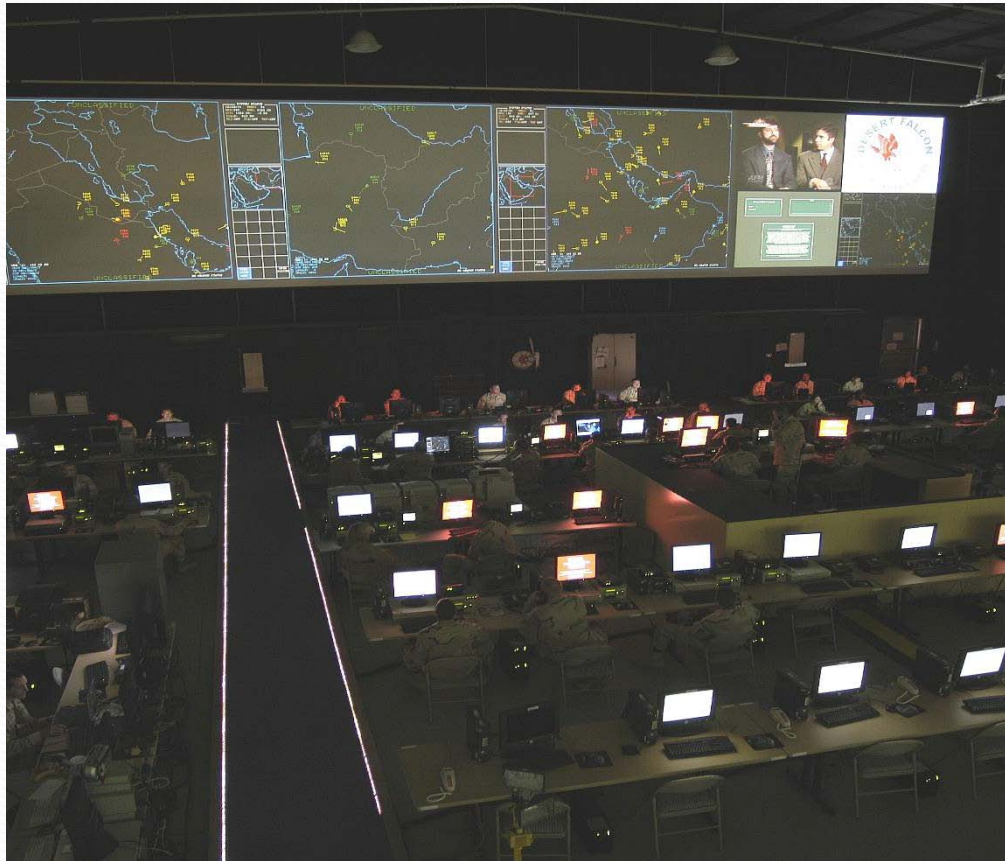
Link 16
<128 Kbps

VMF IDM
UHF SATCOM
<16 Kbps

Line of Sight
Voice



CENTAF AOC Al Udeid AB, Qatar



Combat Ops Division

- **Offensive Operations Core Team**
 - Senior Offensive Duty Officer (SODO)
 - Offensive Duty Officers (ODOs) and Duty Technicians (DTs)
 - Fighter, Attack, Bomber, Tanker, EW, Service-unique aircraft
 - Replanners
- **Defensive Operations Core Team**
 - Senior Air Defense Officer (SADO)
 - Defensive Duty Officers (DDOs) and Duty Technicians (DTs)
 - Theater air defense operations

Combat Ops Division

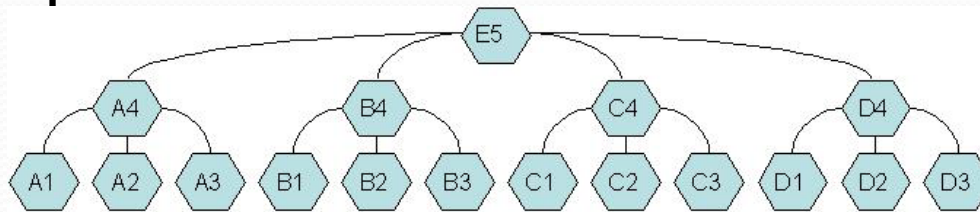
- Combat Ops Division Specialty Teams
 - Space Cell
 - Joint Search and Rescue Coordinator (JSRC)
 - Airspace Management Cell
 - Combat Reports Cell
 - Time Sensitive Targeting Cell (TST)
 - Joint Interface Control Officer (JICO)
 - Intelligence, Surveillance, Reconnaissance Cell
 - Air Mobility Control Team ... Airlift, Refueling, Aeromedical Liaisons

CAOC Decision Cycle



Baseline Scenario Model

- Objective is to identify the who, what, where, when of an adversary attack
- 17 participants on a team



- 4 websites (systems)
 - focused on who, what, where, when
- 68 factoids representing intelligence (clues)
- Three waves of factoid distribution
 - Each wave represents new intelligence

Ops Scenario Model

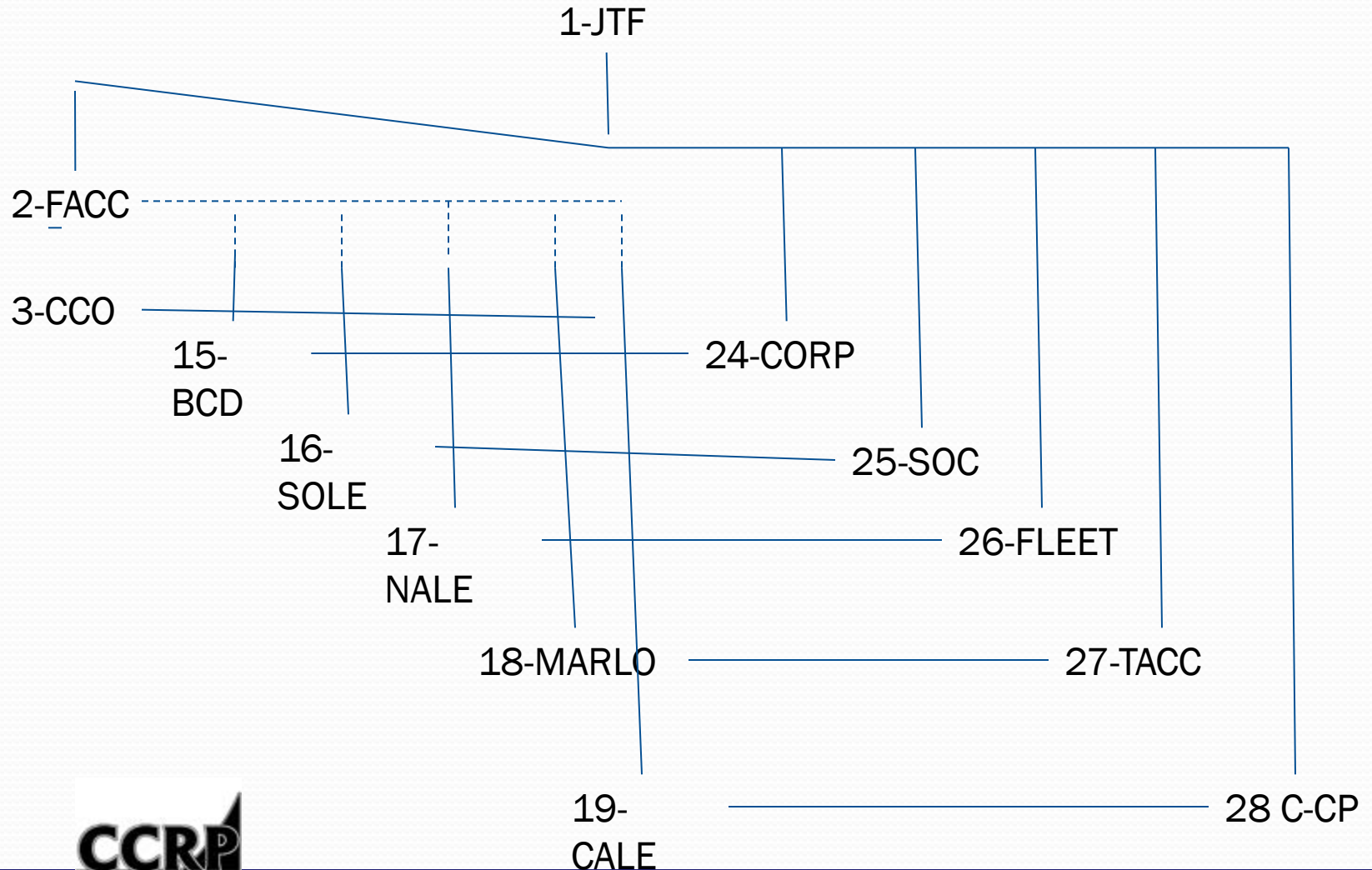
- Objective is to issue the ATO change order and have the distributed team be aware of that order
- 28 groups collaborating on air tasking
 - Represented by agents with *individually tuned behaviors*
- 10 website systems
- 131 factoids representing inter group messages
- 7 waves of factoid distribution
 - Each wave represents a communication round

ATO OPS Websites

- JFC - Joint Force Commander
- JFACC - Joint Force Air Component Command
- CRC - Control and Reporting Center
- WOC - Wing Operations Center
- ASOC - Air Support Operations Center
- CORP - CORP (largest army group)
- SOC - Special Operations Centers
- Fleet - Fleet
- TACC - Tactical Air Control Center (Marine AOC)
- C-CP - Coalition-Command Post system

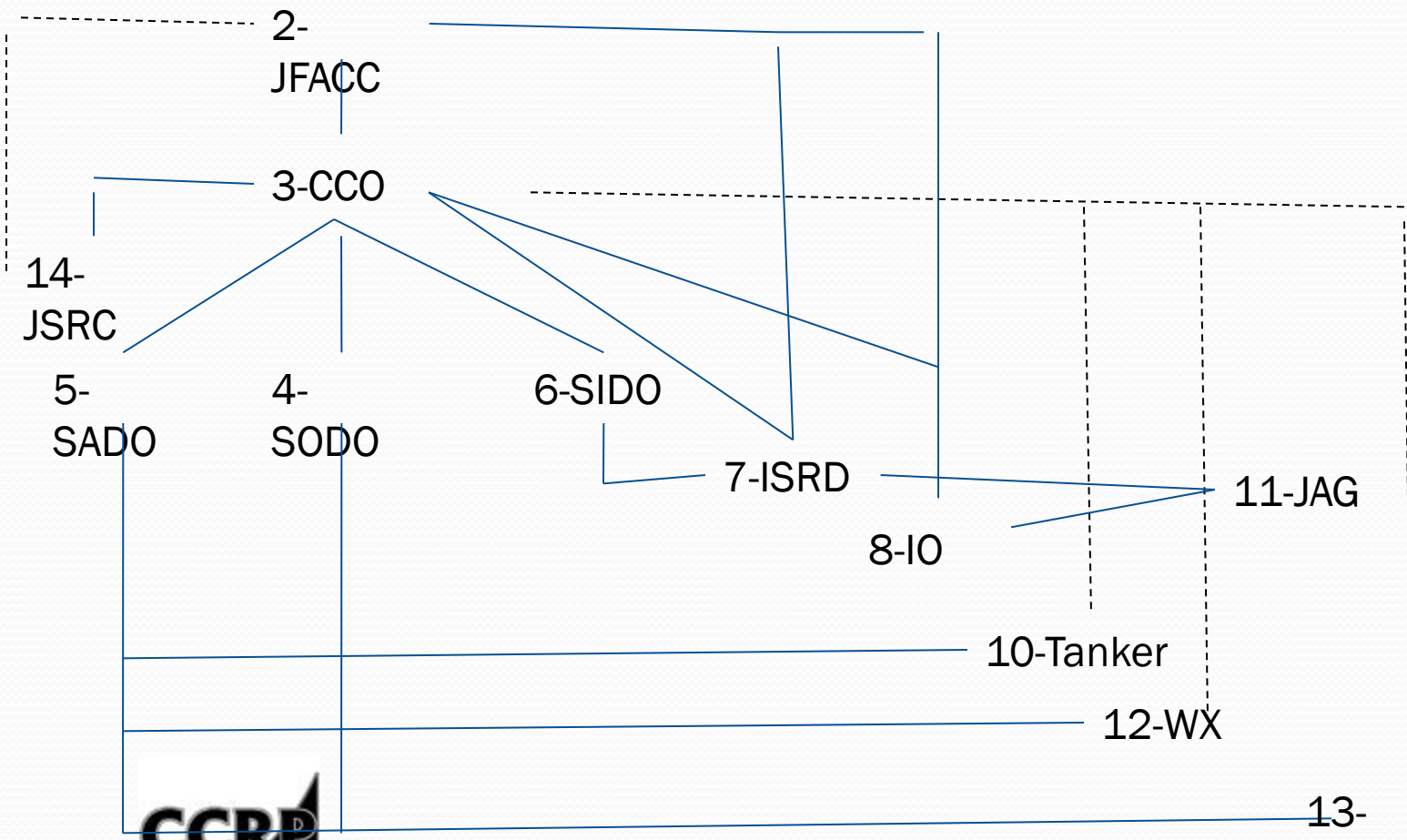


Outside the AOC



Inside the AOC

1-JTF



13-
Airspace

ELICIT Flexibility

- Full support for variable website names and numbers (across all modules)
- Organization structure supports read-only site access
- Varying numbers of waves (up to 2,147,483,648)
- More control of agent communication behavior

Next Steps

- Utilize new scenario model
- Consider making model more granular
 - Configure move waves
 - Reduce time increments
 - Enhance agents to perform calculations (i.e. 30 minutes after 0800 is 0830, etc.)

ELICIT Community of Interest Meeting
Thursday from 1:00 to 5:00

QUESTIONS?



The Science of Control and the Art of Command